source configures a test message in accordance with the predefined traffic flow parameters, time stamps the message, and transmits it to a receiver. As the message is routed through the network, it is identified at each intermediary node as matching the traffic flow, and thus is forwarded along the selected path. Upon receipt at the receiver, the test message is preferably returned to the source in a similar manner. By comparing the time at which the test message is returned with the time stamp contained in the message, an accurate latency of the selected path can be determined.

Significantly, by establishing the reservation state in advance of sending the test message, it can be assured that the test message will follow the selected path whose latency is to be measured without having to load any route information to the test message itself.

**Description of Cited References**

U.S. Patent No. 6,185,219 issued to Christie on February 6, 2001 (hereinafter Christie) teaches a technique for providing communication control that includes a method whereby signaling is processed external to a network element (e.g., a switch) before it is applied by the network element (See Abstract; See also Col. 1, lines 28-32). An external processor receives a first signal and selects a network element, based on the received signal. The external processor then transmits a second signal to the network element before the network element has applied the first signal (See Col. 3, lines 37-45; See also Col. 6, lines 11-24).

Similarly, Christie describes a signaling system for use in conjunction with a plurality of telecommunications switches. The system comprises a plurality of signaling points linked to a signaling processor that resides external to the switches. The signaling processor proc-

esses signaling and generates new signaling that is transmitted over the links to the signaling points (See Col. 4, lines 14-27).

The technique described by Christie allows a telecommunications network to separate communication control (e.g., signaling) from the communications path. According to Christie, an external processor processes signaling carried on a communications path, generates a new signal in a network elements' signal format, and distributes the signal to the network elements. Thus, the external processor can cause the network elements to make connections as directed by the external processor. The network therefore is not limited by the connection capabilities of the individual network elements. Moreover, the network elements are not required to make connections by themselves or to signal one another (See Col. 20, lines 29-63).

Regarding time stamping, Christie does mention placing time stamps in the signaling generated by the external processor. However, Christie merely mentions that time stamps may be added to the signaling for purposes of billing (See Col. 19 line 60 to Col. 20 line14; See also claim 4).

U.S. Patent No. 5,892,754 issued to Kompella et al. on April 6, 1999 (hereinafter Kompella) teaches a flow control system for a computer network that is centered in user applications supplying data to the network (see Abstract). Upon request, the state of congestion in the computer network can be supplied to user applications (see Col. 2, lines 41-44). Specifically, a user application can specify upper and lower bounds of a Quality of Service (QoS) parameter of interest to the user application (see Col. 5, lines 55-59; Col. 6, lines 32-37; and, Col. 6, line 63 to Col. 7, line 9). A network parameter monitor sends event signals

to the user application if the specified QoS parameter falls outside the identified upper or lower bound (see Col. 5, lines 60-67; and, Col. 7, line 19 to Col. 8, line 6). The user application then responds by modifying its flow of traffic into the network (see Col. 5, line 67 to Col. 6, line 2).

One of the QoS parameters mentioned by Kompella is latency. Kompella mentions that latency can be measured by computing the round trip delay of a test message, but does not provide any further details as to how this measurement may be performed (see Col. 7, lines 44-51).

U.S. Patent 5,920,697 issued to Masters et al. on July 6, 1999 (hereinafter Masters) teaches a technique for automatic discovery and use of routing information within a messaging environment and calculating all possible message routes within that environment based on the discovered information. The messaging environment includes multiple sites where each site is defined by a unique address space and is connected to at least one other site (See Col. 2, lines 51-67).

According to Masters, a first site receives routing information that defines routes from a second site to one or more other sites. The first site assimilates this routing information into its previously known routing information and generates an updated accumulation of routing information that it uses to route messages to the one or more other sites (See Col. 2, line 67 to Col. 3 line 15).

The updated accumulation of routing information is contained in a routing table. The routing information may include one or more routes to a particular destination site and a total

cost for each of the routes (See Col. 3, lines 22-26). The routing information may originate from either 1) objects generated and installed by a system administrator; or 2) from routing table information known by a remote site that is made available to the site from the remote site (See Col. 7, line 38 through Col. 8, line 9).

Each route in the routing information is composed of one or more connectors specified in a sequential order. Associated with each connector is a cost that represents a predetermined measure of resources (e.g., monetary expense, bandwidth usage, processing time) for using that connector. The total cost for a route includes the individual costs associated with all the connectors associated with the route plus an optimal increment amount associated with each intermediate site encountered along the route (See Col. 3, lines 39-52).

A message is passed sequentially from one connector to the next connector in the route until the message reaches its destination (See Col. 3, lines 40-43). An intermediate site, upon receiving the message, may re-route the message to account for changes in the network (e.g., if the original designated connector becomes unavailable) or if another route is available that is less expensive than the originally designated route (See Col. 3, lines 53-64).

**§103**

At paragraph 2 of the Office action, claims 1, 2, and 4-7 were rejected under 35 U.S.C. §103 as being unpatentable over Christie in view of Kompella.

**Differences between the Present Invention and the Cited References**

Claim 1 recites in part:

- *"establishing a path state at each network node along the selected path for identifying a traffic flow having predefined parameters"*
- *"generating a test message, the test message configured in accordance with the predefined parameters of the traffic flow"*
- *"in response to receiving the test message at each network node, forwarding the test message from the receiving network node to the next downstream network node along the selected path by virtue of the previously established path states"*
- *"using the time record placed in the test message to determine the latency of the selected path."*

Christie does not teach or suggest **establishing a path state at each network node along a selected path for identifying a traffic flow having predefined parameters and, in response to receiving a test message, forwarding the test message to the next downstream network node along the selected path by virtue of the previously established path states**. Rather, Christie teaches a technique that separates communication control (e.g., signaling) from the communications path in a telecommunications network and enables an external processor to direct connections made by network elements in the network. Thus, the individual network elements need not process nor generate signaling messages carried on the communication path. The technique taught by Christie enables multiple network elements to be connected in a network without being limited by the type of connections the various network elements can control. Nowhere does Christie teach or suggest **establishing a path state for identifying a traffic flow having predefined parameters**.

Neither does Christie suggest or teach **receiving a test message and forwarding the test message along a selected path by virtue of previously established path states.** Christie does not even mention test messages.

Moreover, Christie does not teach or suggest **generating a test message configured in accordance with predefined parameters of a traffic flow or using a time record placed in the test message to determine the latency of a selected path.** Rather, Christie merely mentions that time stamps may be placed in the signaling generated by the external processor and that these time stamps may be used to accommodating billing. Christie does not describe **using time stamps to determine the latency of a selected path.**

Likewise, Kompella does not provide a teaching or suggestion for **establishing a path state at each network node before issuing the test message or for relying on the path state to correctly forward the test message along the desired path through the network**. At best, Kompella suggests loading the test message itself with the path. This approach, however, severely limits Kompella to those computer networks that support messages, which carry route information in their headers. By establishing path state in advance, applicant's invention works in networks where messages do not carry path information, thereby making the present invention usable in a much larger number of networks than Kompella.

Moreover, Kompella does mention using a test message to measure latency, however, Kompella does not teach or suggest **generating a test message, the test message configured in accordance with the predefined parameters of the traffic flow or using the time record placed in the test message to determine the latency of the selected path.**

Applicants' respectfully urge that neither Christie nor Kompella suggest or teach either individually or in combination Applicants' claimed steps of:

- ***"establishing a path state at each network node along the selected path for identifying a traffic flow having predefined parameters"***
- ***"generating a test message, the test message configured in accordance with the predefined parameters of the traffic flow"***
- ***"in response to receiving the test message at each network node, forwarding the test message from the receiving network node to the next downstream network node along the selected path by virtue of the previously established path states"***
- ***"using the time record placed in the test message to determine the latency of the selected path."***

**§103**

At paragraph 4 claims 8, 9, 13 and 14 were rejected under 35 U.S.C. 103 as being unpatentable over Christie in view of Masters.

**Differences between the Present Invention and the Cited References**

Claim 8 recites in part:

- ***"inserting into the path state setup message a source routing option that lists one or more network nodes along the selected path"***
- ***"inserting into the path state setup message one or more parameters that define a selected traffic flow that is to be associated with a test message for determining a latency of the selected path."***

Claim 13 recites in part:

- ***"an options processor in communicating relationship with the plurality of interfaces, the options processor configured to implement one or more options included in a received path state setup message identifying a traffic flow"***
- ***"a signaling protocol processor in communicating relationship with the options processor, wherein the options processor and signaling protocol processor cooperate to implement a source routing option included in the path state setup message by initializing a path state associated with the traffic flow and forwarding the path state setup message to a next network node as identified in the source routing option."***

Neither Christie nor Masters suggest or teach, either individually or in combination, applicants' novel **inserting into the path state setup message a source routing option** or **a signaling protocol processor in communicating relationship with the options processor, wherein the options processor and signaling protocol processor cooperate to implement a source routing option included in the path state setup message by initializing a path state associated with the traffic flow.** Rather, as noted above, Christie teaches a technique for providing communication control that includes a method in which signaling is processed externally to a switch before it is applied by network elements and Masters teaches a technique for automatic discovery and use of routing information. Both Christie and Masters are silent on **inserting a source routing option into path state setup message or implementing a source routing option**.

Applicants' respectfully urge that neither Christie nor Masters suggest or teach, either individually or in combination, Applicants' claimed steps of:

- ***"inserting into the path state setup message a source routing option that lists one or more network nodes along the selected path"***
- ***"inserting into the path state setup message one or more parameters that define a selected traffic flow that is to be associated with a test message for determining a latency of the selected path"***

or Applicants' claimed steps of:

- ***"an options processor in communicating relationship with the plurality of interfaces, the options processor configured to implement one or more options included in a received path state setup message identifying a traffic flow"***
- ***" signaling protocol processor in communicating relationship with the options processor, wherein the options processor and signaling protocol processor cooperate to implement a source routing option included in the path state setup message by initializing a path state associated with the traffic flow and forwarding the path state setup message to a next network node as identified in the source routing option."***

For the reasons set forth above, applicants submit that all independent claims are believed to be in condition for allowance and that all dependent claims are believed to be dependent from allowable independent claims and therefore in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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